their manners, methods and creeds, is of the greatest scientific value—all the greater that, as civilisation advances, opportunities for the careful study of these people will surely diminish. It is indeed the human interest in exploration which now specially calls for the attention of geographers, for such slight glimpses as we can get into the earliest stages of human existence are getting less and less. They are rapidly passing away, whilst the great wide spaces of unexplored world-surfaces where humanity is not, and never was, can well await the geographer of the future.

T. H. HOLDICH.

POTASSIUM SALTS AND AGRICULTURE.

ONE of the first results of the European War was to cut off the supply of potassium salts, which play a large part as fertilisers in modern agriculture. Our crops of potatoes and our supplies of milk are particularly dependent on abundant supplies of these particular fertilisers, and practically all the world's supply has hitherto come from the Stassfurt deposits in Germany.

The three crops that stand most in need of potassic fertilisers are potatoes, mangolds (used for dairy cows), and sugar beets. In addition, two types of soil need them for other crops: light sandy soils and peaty soils. Enormous amounts are required in Germany, where vast areas of these two types occur, and where sugar beets and potatoes are largely grown; in Sweden for the same reasons; in France and the United States for the production of sugar beets; and in this country for mangolds and potatoes. It is not surprising, then, that nearly ten million metric tons per annum are consumed.

Fortunately the conditions in British farming are such that potassic fertilisers are not indispensable, at any rate for two or three years. Potassium salts form insoluble combinations in the soil, and do not wash out; any excess not removed by the crop is therefore in safety. Further, a considerable proportion of what is absorbed by the crop finds its way back to the soil in farmyard manure, the materials sold off the farm not as a rule containing much potash. The supplies stored in the soil can be utilised to advantage by a suitable dressing of lime or chalk, which displaces the potassium from its insoluble combinations, and also by addition of sodium chloride, which has the same effect and in addition economises the consumption of potassium by the plant.

But there are sources still open to the farmer. Seaweed contains considerable quantities of potassium, which would become available on a proper reorganisation of the kelp industry on modern lines. The farm itself can also supply something. At this time of the year a good deal of hedge cleaning has to be done to make a clear way for the plough, while later on the hedges have to be cut back to keep them sufficiently low. The material is very bulky, and has to be burnt straight away; it yields an ash found at Rothamsted to contain about 10 per cent. of potash (K_2O), which is thus nearly as rich as kainit (12·5 per cent. K_2O). The hedges from each ten acres of land yield about 1 cwt. of ash, so that a 300 acre farm—quite a usual size for a holding—could provide itself with about 30 cwts. per annum if all could be collected. Unfortunately collection is a matter of some practical difficulty excepting in fine dry weather.

Taking all circumstances into consideration, however, it does not appear that British agriculture will suffer for two or three years from potash starvation, though when conditions become more normal the farmer will no doubt be glad enough to replenish the stocks in his manure shed and his soil. Up to the present it does not appear that any other of the common fertilisers will be cut off through the war. Indeed, the tendency is all the other way, and some of the supplies usually shipped to the Continent are now available for use in this country.

E. J. R.

NOTES.

THE anniversary dinner of the Royal Society, usually held on St. Andrew's Day, November 30, will not be held this year.

THE following have been elected officers of the Cambridge Philosophical Society for the ensuing session, 1914–15:—*President*: Prof. Newall. *Vice-Presidents*: Dr. Barnes, Prof. Seward, Dr. Shipley. *Treasurer*: Prof. Hobson. *Secretaries*: Mr. A. Wood, Mr. F. A. Potts, Mr. G. H. Hardy. *New Members of the Council*: Mr. J. A. Crowther, Mr. H. H. Brindley, Dr. Fenton, Mr. H. Hamshaw Thomas.

ACCORDING to the Christiania correspondent of the *Morning Post*, a monument in the form of a monolith 15 ft. high has just been completed at Christiania and is intended to commemorate the gallantry of the late Captain Scott and his companions in their Antarctic expedition. It has been subscribed for by Norwegian friends of the explorer. On the front are inscribed the names of Captain Scott and those who died with him, while at the back is a short record of the expedition.

A CASE is recorded in the daily papers of a soldier who, during a recent engagement, was shot in the forehead, the bullet passing out of the back of his head without killing or even stunning him. He remarked, "Everything seems green all round me." When in the hospital tent he still saw everything green, but otherwise made no complaint. This case appears to favour the cerebral theory of colour vision of Dr. Edridge-Green, the shock to the brain having altered the discriminatory apparatus so that impulses caused by green rays had a preponderating influence.

THE opening meeting of the one hundred and sixty-first session of the Royal Society of Arts will be held on Wednesday evening, November 18, when an address will be delivered by Sir Thomas H. Holdich, vice-president and chairman of the council. The following are among the arrangements for meetings before Christmas:—November 25, Sir William A. Tilden, "The Supply of Chemicals to Britain and her Dependencies; December 2, Dr. W. R. Ormandy, "Britain and Germany in Relation to the Chemical Trade"; December 9, Mr. W. A. Young, "Domestic Metal Work of the Eighteenth Century"; December 16, Sir William Abney, "Testing Pigments for Permanence of Colour"; December 17, Dr. F. Mollwo Perkin, "The Indian Indigo Industry."

WE notice with satisfaction that various scientific societies are welcoming Belgian refugees who are interested to attend their meetings. The Society of Engineers has opened the offices of the society at 17 Victoria Street, Westminster, daily from 10 a.m. to 4 p.m. (Saturdays, 10 a.m. to 1 p.m.), to Belgian engineers who are now in England on account of the war, and they are invited to apply to the secretary when they are in need of any information. Belgian engineers who are unable to call are invited to send their names and addresses to the secretary so that they may be in touch with their colleagues and receive invitations to the meetings. A committee of the Linnean Society has been empowered to invite Belgian botanists (whether ladies or gentlemen) to attend the meetings of the society and to make use of the library. The council of the London Natural History Society, too, invites any Belgian refugee interested in natural history to attend the meetings of the society and offers them the use of the society's library and collections. Particulars of the meetings, which are held at Hall 20, Salisbury House, London Wall, E.C., at 7 p.m. on the first and third Tuesdays of the month, can be obtained from the honorary secretary, Mr. J. Ross, 18 Queen's Grove Road, Chingford, N.E.

MR. H. W. CODRINGTON, of the Ceylon Civil Service, has compiled a useful catalogue of the collection of the European (exclusive of Roman) and Muhammadan coins in the Columbo Museum. The Indo-Portuguese and the Dutch coinage of the period 1640–1796 are well represented in the collection, and this catalogue, which is illustrated by a good series of process plates, will be of considerable interest to numismatists.

THE Journal of the Royal Society of Antiquaries of Ireland for September is largely occupied with a guide to the antiquities of Dublin and the neighbourhood provided for the use of the meeting which was held in June last. This publication is written by the most competent authorities, is well illustrated, largely from old engravings, and contains a fuller and more judicious account of the local antiquities than can elsewhere be procured. The description of St. Doulagh's Church, with its remarkable anchorite's cell, is specially to be commended.

IN *Man*, for November, Mr. J. Reid Moir discusses the question of the striation of flint surfaces in relation to the speculations of Dr. W. Allen Sturge, who attributes the markings on flints found in north-west Suffolk to at least six minor glaciations which occurred in Neolithic times, and he thus pushes back the advent of Neolithic man to a period about two hundred thousand years ago. Mr. Reid Moir, as the result of experiments on flint scratches, points out that this substance is far from being homogeneous, and that the belief in its hardness applies only to a freshly broken, unchanged sound flint. Exposure to the atmosphere produces patination or softening. It is thus impossible that flints long exposed to the weather could retain these scratchings for a lengthened period, and those found lying on the surface may owe their striation to ordinary causes, possibly connected with agricultural operations. The composition and character of flint are so important in connection with the age attributed to implements made of this material, that a more thorough examination of flint structure and its susceptibility to striation is an inquiry which should be systematically undertaken by a committee of competent geologists and archæologists.

IN the Journal of the Royal Society of Antiquaries of Ireland for September Mrs. Brunicardi contributes an interesting summary of our existing knowledge of the shore-dwellers of ancient Ireland. The map shows the curious distribution of their kitchen-middens. They appear at only three sites on the east coast, while on the west and south they are fairly numerous, chiefly in Donegal, Galway, Clare, Kerry, and near the harbours of Cork and Waterford. The writer discusses these remains in great detail with references to the original authorities. Very little pottery and no evidence of the use of metal are found in them, and Mr. Knowles regards them as among the earliest remains we possess of the Neolithic age. These shore-dwellers appear to have been a distinct race, probably a degraded one, living almost entirely on shell-fish, periodically migrating in search of food, but possessing what may be termed headquarters to which the whole tribe sometimes returned, and this they regarded as their home.

IN *Folk-Lore* for September Mrs. B. Z. Seligmann discusses the curious customs of demon possession and devil-dancing known in Egypt as the Zâr. After a full description of the rites, she arrives at the conclusion that they may have a double origin, from Abyssinia and the Sudan. The word Zâr is clearly Abyssinian, and must have been recognised in Egypt before the opening of the Sudan by Mahomed Ali and the consequent importation of black slaves. It must be remembered that the Red Sea route has been open for more than 2000 years, while intercourse with the Upper Nile has been intermittent, generally confined to raiding and plundering. This route, again, was barred by the Christian kingdom of Aloa, which up to the fifteenth century formed a barrier between Egypt and the Sudan. But whatever date may be assigned to the introduction of the Zâr into Egypt, there can be no doubt that its present popularity among the higher classes is due to the influence of black slaves received into the harems on a footing of perfect equality. Hence their cult of the dead was soon modified into a general belief in spirits which reinforced that which had perhaps already reached Egypt from Abyssinia. Mrs. Seligmann's graphic account of these rites may be usefully compared with that recently published by Major A. J. N. Tremearne, of Hausa customs of the same kind in his valuable work entitled "The Ban of the Bori."

WE have received from Mr. Edwards, of High-street, Marylebone, a catalogue of works relating mainly to fishes, fisheries, and angling.

Two excellent plates illustrate an article by Dr. Annandale in vol x., part 5, of Records of the Indian Museum on new and other stalked barnacles from Indian waters. Most of the species are of minute size; the most remarkable being one (*Heteralepas reticulata*) found in clusters on the spines of a sea-urchin. It is easily recognised by its "honey-pot" shape.

A MUCH compressed report, crowded with detail, by Mr. T. Southwell, on the fauna of the Ceylon pearl-banks, and a second on the food of certain marine Ceylonese fishes have been issued in the Educational Section (Science and Art) of the Ceylon Administration Reports for 1912–13. Portions, at least, of the notes are promised in another and fuller form, when it probably will be easier to grasp and assimilate their contents.

IN the October issue of *Naturen* Mr. O. J. Lie-Pettersen continues his illustrated account of the Norwegian tit-mice. The birds of Sarawak form the subject of an article in vol. ii., No. 5, of the Sarawak Museum Journal, by Mr. R. B. Williams, who has made coloured sketches of about one hundred species, from examples shot by himself. These sketches are accompanied by notes on the appearance of the freshly-killed birds and on the habits of the various species, and it is from these that the article has been compiled by Mr. J. C. Moulton.

ACCORDING to a notice in the November number of the *Museums Journal*, Dr. F. A. Lucas, director of the American Museum of Natural History, New York, disapproves, as a general rule, of large special exhibits in zoological museums, on the ground that when they are closed there is a marked falling off in the normal number of visitors. This, however, has not been the experience at the Natural History branch of the British Museum, as a result of the various special exhibitions which have been displayed at different times during the last few years; and even if it were the case, it would afford no argument for the abandonment of such temporary "side-shows."

IN addition to the gift of the type skull of the perissodactyle mammal *Pliolophus vulpiceps*, to which allusion has been made previously in our columns, Mrs. Richard Bull, widow of the late vicar of Harwich, has presented to the British Museum (Natural History) a skull and three shells of one or more of the three large species of marine turtles of the genus Lytoloma which occur in the London Clay of the Essex coast. The museum has also secured a specimen of the chelonian from the London Clay originally described by Owen as *Emys testudiniformis*, but now referred to the American fresh-water genus Chrysemys. It is in far better preservation than the type, and hitherto only known, specimen.

A GROUP of three East African buffaloes shot during the Roosevelt expedition was set up some time ago in the U.S. National Museum, amid an imitation of African scenery constructed of such material as was obtainable at Washington. This, however, was only a makeshift, and the museum has recently procured from East Africa a quantity of papyrus and reeds for the purpose of making a really vivid model of a buffalo-swamp. In the case of the papyrus the stems are slit open, the pithy interior removed and replaced by plaster, and the whole painted green. For the last few months the buffalo group has been withdrawn from public exhibition; but according to an announcement made by the Smithsonian Institution at the end of October, it was then shortly to be reinstated with its new surroundings complete.

THE October Bulletin of the American Geographical Society contains a preliminary report by Mr. R. S. Holway on the recent volcanic activity of Lassen Peak in northern California. The mountain, which rises at the southern end of the Cascade Range to a height of 10,437 ft., is an old volcanic cone from which a lava flow occurred some two centuries ago. On the north side of the bowl of the old crater, a series of steam explosions, beginning on May 30 last, has opened a new vent, from which stones have been thrown over an area more than half a mile in diameter. No freshly molten lava has been seen, and no heat has been noticeable except that of the escaping steam. Mr. Holway gives a list of twenty eruptions up to July 15. The formation of this new vent is the first recorded instance of volcanic activity witnessed in the United States, excluding the outlying regions.

WE have received from Japan the three parts of the Bulletin of the Imperial Earthquake Investigation Committee which were issued in the months of July, August, and September of the present year. The first two of these are devoted to a discussion by the able seismologist, Prof. Omori, of the eruptions and earthquakes of Asama-yama from 1911 to the date of issue. The records of the seismographs at the volcano-house of Yuno-taira and more distant localities are compared with the observations made in the crater of the volcano, the general conclusion arrived at being that the activity within this gigantic volcanic vent is now gradually subsiding. In the number issued in September, the same indefatigable observer gives a graphic account of his own studies of the Sakura-jima eruptions and earthquakes in January, 1914. The author was a member of the Commission sent by the Japanese Government to prepare a record of that eruption, which Prof. Omori thinks "may be counted, in point of the magnitude of disturbance, as one of the greatest volcanic catastrophes in modern times." An account of this outburst appeared in NATURE of January 22, 1914 (vol. xcii., p. 589). The bulletin is published in English, and the printing and illustrations reflect the greatest credit on the Japanese publishing office. More than fifty plates, including exquisite photographs with clear maps and diagrams, illustrate these three numbers, which constitute a very important contribution to the sciences of seismology and vulcanology.

THE Bulletin of the Imperial Institute (vol. xii., No. 3) contains, in addition to reports on the results of the scientific and technical work of the staff on various colonial products, a special article on the agricultural resources of the Zanzibar Protectorate by Mr. F. C. McClellan, Director of Agriculture, Zanzibar, who describes the climate and system of land tenure in this portion of the Empire, discusses questions of labour and wages, and deals fullv with crops and products, the chief of which are coconuts and cloves. In the latter article Zanzibar has practically a monopoly of production. In connection with the campaign for the capture of German trade an article on the trade in palm kernels is of importance as showing that a large proportion of the exports of palm kernels from West Africa are shipped to Germany, where they are used as the source of palm kernel oil and of cake for feeding live-stock, much of the palm kernel oil being re-shipped to this country. This important trade and industry could be well carried out in this country. Other articles deal with the utilisation of waste fish as a source of manure, the tin resources of Australia, South Africa, and Nigeria, and the trade of the Seychelles. Prof. W. R. Dunstan's address at the opening of the third International Congress of Tropical Agriculture (June, 1914) is printed *in extenso*.

THE *Scientific American* for October 10 contains several features of particular current interest. In an editorial the view is put forward that in the event of conscription becoming universal, scientific men should be exempt. They are of incalculable value in the advancement of mankind, and as such their loss would entail greater sacrifices than could be compensated for by their use in the fighting field in which their efficiency and their numbers would probably be too small to have any appreciable influence. In a short note a method is given of hardening the concrete floors of factories. A mixture of 15 to 20 lb. of iron dust with 100 lb. of cement and twice that amount of sand is applied as a surface coating about an inch thick.

WE learn from the Smithsonian Institution that Mr. T. W. Smillie, who has been photographer to the United States National Museum in Washington for the last forty-five years, has gathered together and arranged for the museum a collection of ancient and modern photographic apparatus and specimens. It is claimed that this collection is the most complete in the world. It includes what is believed to be the first American camera, namely, that made in 1839 according to Daguerre's specification, for Dr. S. F. B. Moore; also a print from one of Niepce's plates made in 1824, several fine Daguerreotypes dating from 1839 and onwards, specimens of Fox Talbot's earliest process, and his calotypes, and some early examples of "moving pictures."

JUST as everyone should know something about the general rudiments of astronomy so a knowledge of the elements of our weather and climate should be universally understood in these isles. The earlier such knowledge is acquired the more natural is the interest taken in such figures and diagrams which appear in our daily papers. Besides, we all experience our "weather," and this should be sufficient to bring home to us the importance of understanding such data as are thus placed before us, and should make us wish to take an intelligent interest in some of the elementary principles. Under the title of "Weather Chart Exercises" (British Isles and West of Europe), compiled by Miss L. M. Odell, and published for the University of London Press by Messrs. Hodder and Stoughton (London), we have before us a series of exercises which have been given in connection with the explanation of the weather charts issued by the London Meteorological Office, and in the working out of climate with special reference to the British Isles. The exercises consist in drawing monthly curves of rainfall and temperature, drawing isotherms and isobars, differentiating between high- and low-pressure systems, and many other important factors regarding weather. All the data which are to be used are given in tables, printed forms and charts accompanying them so as to minimise the time spent by the pupil in unnecessary and mechanical work not really belonging to the subject. The exercises are arranged in a progressive order of difficulty and the treatment throughout is excellent and reflects great credit on the compiler. The fact that the new units (millibars), as well as the old, are employed, speaks well for the up-to-date character of the work. It may be suggested that as the map showing the "observation stations" and the "conversion tables" are so frequently to be used both of these should be printed on folding leaves at the end so as to be before the student on whatever page he or she may be working.

IN the *Biochemical Journal* (vol. viii., No. 4, p. 438) Miss M. Cunningham and Dr. C. Dorée discuss the formation of ω-hydroxyfurfuraldehyde from various carbohydrates on distillation with hydrochloric acid under the conditions generally used in estimating pentoses by the well-known Tollens-Kröber method. The formation of this aldehyde is a source of error in estimating the pentoses, but it is shown that the condensation which produces the true furfural is almost completed before the hydroxymethyl derivative begins to distil over, and by using aniline acetate test paper it is possible to distinguish between the separation of the two aldehydes, so that little error is made in the estimation of pentoses or pentosans. Light is thrown in this paper on the so-called "furaloid" constituents of plants; in all probability these are merely hexose-yielding substances, which give hydroxymethyl aldehyde on distillation with acid, the latter substance being then largely decomposed by a second distillation with acid.

IN *Science Progress* for October Dr. H. W. Bywaters gives an account, under the title "Vitamines," of recent work on nutrition, and of the light thrown by the researches of Funk, Hopkins, Osborne, and Mendel on the cause of such "deficiency diseases" as beri-beri, pellagra, scurvy, and rickets. These researches emphasise once again the importance of the part played by the "infinitely small" in vital changes, a part which has been more and more realised during recent years with the increased knowledge obtained of enzymes and similar agents. In a paper on the biochemistry of respiration, Dr. H. M. Vernon shows how recent research points in the main to its being dependent on intracellular enzymes—in some cases purely hydrolytic, in others partly hydrolytic, partly oxidative. Dr. R. W. Hegner deals with the germ-cell cycle in animals, Mr. A. G. Thacker has a paper on extinct apes, whilst Mr. W. L. Balls considers the question of the aid to be given by science in the future to the growing and utilisation of cotton. The theories of dyeing are discussed by Mr. E. A. Fisher, the problem of smoke abatement by Mr. J. B. C. Kershaw, whilst Mr. James Huneker has a short illustrated article on tornadoes and tall buildings.

THE geared turbine Atlantic liner *Transylvania* ran her trial trips a fortnight ago, and the observations of a representative of the *Engineer* who was present are of interest. There is some vibration in certain parts of the ship, but nothing to be compared with that which would be experienced with reciprocating engines. It was local, and of a very innocent description; it fact, it might be described as merely an absence of stillness. Owing to the high revolution speed of the turbines—1500 r.p.m.—the vibration speed is high. The noise in the engine-room is at present quite considerable, and is the typical roar of high-speed gearing. It is not easy to see how the noise may be eliminated entirely, in spite of the beautiful machines invented for cutting the gears. On the third-class passenger deck, gear noise disappeared totally at a distance of about 150 ft. from the engine-room entrance. On the deck above this, the noise disappeared at about 90 ft. from the companion-way. In fact, in the space used for passengers, the noise is just noticeable while listening carefully for it, and hence cannot be considered objectionable from the passengers' point of view, especially as the sound is not high-pitched.

THE Carnegie Institution of Washington has issued the first part—A to H—of the "Index to United States Documents relating to Foreign Affairs, 1828–61," which is to be completed in three parts. The index is the work of Miss Adelaide R. Hasse, the head of the department of documents in the New York Public Library, and an idea of the magnitude of her task can be formed from the fact that the present instalment of the index runs to 793 large pages. In addition to the reports of Congress, the following series of documents have been indexed: the Senate Executive Journal, for diplomatic and consular appointments and treaty ratifications; the Opinions of the Attorneys-General, for decisions on questions of international controversy; the Statutes-at-Large, for acts and resolutions relating to international affairs; and the Congressional Globe and its predecessors for speeches and correspondence.

OUR ASTRONOMICAL COLUMN.

COLOURS OF STARS IN THE CLUSTER M13 (HERCULES).—When stars are too faint to be spectroscopically examined, some idea of the type of spectrum involved can be gathered from their visually observed colour. It may happen that the stars are even so faint when seen in a powerful telescope that they exhibit no colour at all; it is then that the photographic plate is called in, the sensitive film being a great differentiator of colour. In the case of star clusters the opportunity is afforded of comparing a great number of stars, and it is of extreme value to know whether the stars involved are all of one physical condition or same spectral type, or whether they show representatives of all types. Especially is this the case when it is remembered that star clusters are most remote and must therefore be of immense magnitude. The photographic determination of the colours of some of the stars in the cluster M13 in Hercules is therefore of great value in this connection, and the research which we owe to Prof. Barnard (*Astrophysical Journal*, vol. xl., No. 2, September) is one that will be read with interest. In this paper the stars are practically divided into two colour classes, namely, blue stars and yellow stars, and this has been done by comparing two photographs of the same cluster taken under two conditions. One photograph was secured with the 13-in. astrographic refractor of the Potsdam Observatory, and the other with the 40-in. refractor of the Yerkes Observatory. The optical conditions on the Potsdam photograph were such that the blue stars were relatively brighter than the yellow stars, while on the Yerkes plate the reverse was the case. A comparison of the plates thus afforded a means of separating these coloured stars, but care had to be taken to eliminate all comparisons of star images where variability might be involved. Prof. Barnard concludes that in this cluster there exist stars of extremely different types, and hence, by inference, that there are stars of all the different spectral types. The paper is accompanied by reproductions of the Yerkes and Potsdam plates and an index chart.

THE ELECTRIC ARC AND SPECTRAL LINE DISPLACEMENTS.—Numerous references have been given in this column to investigations on the causes in terrestrial spectra of displacements of lines from their normal positions. In fact, the inquiry which was started some years ago to select and adopt certain standards of wave-length of iron, etc., show that little was known about the behaviour of lines under different conditions of electric current, arc length, etc. All attempts therefore to arrive at a final selection of lines suitable as standards are of fundamental importance to spectroscopists and astro-physicists, and in this report the communication by Mr. T. Royds (Kodaikanal Observatory, Bulletin xl.) on an investigation of the displacement of unsymmetrical lines under different conditions of the electric arc will be welcomed. To find a light source giving normal wave-lengths for all classes of lines is therefore an inquiry of the first order, and the present paper is an advance in that direction. The results of the present work are summed up in a series of brief paragraphs at the end of the paper, and while only a few of these can be referred to here, the reader should consult the original bulletin. When the spectrum of the region of the arc near the negative pole is compared with that of the centre, the unsymmetrical lines are displaced in the direction of their greater widening; symmetrical lines have very small or no displacements. The displacement near the positive pole is about half that at the negative. A displacement of the same sense as that at the poles is produced at the centre of the arc by increasing the current or shortening the arc. The displacement at the negative pole is reduced if only the positive pole is supplied with the material producing the spectrum. Displacements occur in the arc *in vacuo*, but to a much smaller extent than in air, and he suggests that the arc *in vacuo* is a better source for the determinations of standards of wave-length and for comparisons with the sun's spectrum.